Christopher L. Getchell
8455 S. 19th Suite 12A
Tacoma, WA 98465
206-565-5492

BIOASSAY TESTING SERVICES
Acute and Chronic Toxicity Testing

January 29, 1991

Greg Speer
Alaskan Copper
628 South Hanford
Seattle, WA 98124

Dear Greg,

Enclosed are the results of the Hazardous Waste Characterization test to determine if your sample numbers A, B and C are a dangerous, extremely hazardous or solid waste following DOE WAC 173-303 method 80-12.

As you can see from the results there were no mortalities at either the 100 or 1000 ppm dilutions for Sample "A". This material would simply be classified as a solid waste.

There was 1/30 mortalities at the 1000 ppm dilution and 0/30 mortalities at the 100 ppm dilution for sample "B". This sample would also be classified as a solid waste.

For sample "C" there were 16/30 mortalities at the 1000 ppm dilution and 0/30 mortalities at the 100 ppm dilution. This material would be classified as a dangerous waste as far as bioassays are concerned.

The classification is based on dilution and number of mortalities. If you have 11/30 or more mortalities at the 1000 ppm dilution the material is classified as a dangerous waste. If you have 10/30 or more mortalities at the 100 ppm dilution the material is classified as an extremely hazardous waste. If neither of these criteria are exceeded the material is simply classified a solid waste as far as bioassays are concerned.

If you have any questions about the data or I can be of any further assistance to you please do not hesitate to call.

Sincerely,
Christopher L. Getchell
Christopher L. Getchell
Oceanographer/Biologist

BIOASSAY TESTING SERVICES
8455 So. 19th
Tacoma, WA 98465
(206) 565-5492

STATIC ACUTE FISH TOXICITY TEST

Customer Name: Alaskan Copper
Address: 628 South Hanford
Seattle, WA 98124

Contact: Greg Speer
Phone: (206) 623-5800 ext. 569

Sample Identification: Sample "A"
Analysis Performed: Hazardous Waste Characterization

TEST METHOD:

1. **Toxicity test method used:**
   Salmonid survival test- "General Procedure for Static-Bioassay to Evaluate Industrial Effluent Toxicity," Washington Department of Ecology. Revised January 24, 1984; and Biological Testing Methods. Part A, Static Acute Fish Toxicity Test." DOE 80-12. Revised July 1981.
2. **End point(s) of test:**
   Mortality or 96 hours
3. **Deviations from reference method, if any, and the reason(s):**
   No deviations
4. **Date and time test started:**
   01/24/91, 1800hrs
5. **Date and time test terminated:**
   01/28/91, 1800hrs
6. **Type of test Chamber:**
   Glass chamber, 20"X10"X15"
7. **Volume of solution used/chamber:**
   30 litters, 13" deep.
8. **Number of organisms/test chamber:**
   10 organisms
9. **Number of replicate test chambers/treatment:**
   3 replicates
10. **Acclimation of test organisms(mean and range):**
    30 days, 10 to 90 days
11. **Test temperature (mean and range):**
    12 degrees centigrade, (12.0, 11.9-12.2)

TEST ORGANISM:

1. **Scientific name:**
   Salmo gairdneri(rainbow trout)

2. **Age:**
   153 days
3. **Life stage:**
   Fingerling
4. **Mean length, weight, and loading:**
   4.3cm, 2.05gms, .68gm/l
5. **Source:**
   Cascade Rainbow Trout Fish Farm
6. **Food:**
   Trout chow
7. **Lighting:**
   16 hours light, 8 hours dark, 50 to 100 foot candles
8. **Diseases and treatment:**
   No diseases detected, no treatment necessary
9. **Dilution water used in test:**
   Dechlorinated and aged municipal water

CHEMICAL ANALYSIS:

1. **Physical and chemical methods used:**
a. Temperature-Digital temperature probe
b. Dissolved oxygen-Membrane Electrode/Azide Modification
c. pH-Standard electrode
d. Conductivity-Conductivity meter
e. Hardness-Titrimetric/EDTA
f. Alkalinity-Titrimetric/Phenolphthalein-Sulfuric acid
g. Weight-Beam balance
h. Residual chlorine-Colorimetric/Ortho-tolidine
i. Ammonia-Colorimetric/Nesslerization
j. Nitrate-Colorimetric/Cadmium reduction

RESULTS:

1. **Concentration:**
a. 1000 mg/l(ppm)
b. 100 mg/l(ppm)
c. Control
d. Reference toxicant(25 ppb copper)
2. **Observed effects:**
a. 0/30 No mortalities
b. 0/30 No mortalities
c. 0/30 No mortalities
d. 0/10 - 0% mortality
3. **Raw biological data, including daily records of affected organisms in each concentration(including controls):**
a. See appendix "A"
b. See appendix "A"
c. See appendix "A"
d. See appendix "A"
4. **Summary table of physical and chemical data:**
a. See appendix "A"
b. See appendix "A"
c. See appendix "A"
d. See appendix "A"

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STATIC ACUTE FISH TOXICITY TEST

Customer Name: Alaskan Copper
Address: 628 South Hanford
Seattle, WA 98124

Contact: Greg Speer
Phone: (206) 623-5800 ext. 569

Sample Identification: Sample "B"
Analysis Performed: Hazardous Waste Characterization

TEST METHOD:

1. **Toxicity test method used:**
   Salmonid survival test- "General Procedure for Static-Bioassay to Evaluate Industrial Effluent Toxicity," Washington Department of Ecology. Revised January 24, 1984; and Biological Testing Methods. Part A, Static Acute Fish Toxicity Test." DOE 80-12. Revised July 1981.
2. **End point(s) of test:**
   Mortality or 96 hours
3. **Deviations from reference method, if any, and the reason(s):**
   No deviations
4. **Date and time test started:**
   01/24/91, 1800hrs
5. **Date and time test terminated:**
   01/28/91, 1800hrs
6. **Type of test Chamber:**
   Glass chamber, 20"X10"X15"
7. **Volume of solution used/chamber:**
   30 litters, 13" deep.
8. **Number of organisms/test chamber:**
   10 organisms
9. **Number of replicate test chambers/treatment:**
   3 replicates
10. **Acclimation of test organisms(mean and range):**
    30 days, 10 to 90 days
11. **Test temperature (mean and range):**
    12 degrees centigrade, (12.0, 11.9-12.2)

TEST ORGANISM:

1. **Scientific name:**
   Salmo gairdneri(rainbow trout)

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STATIC ACUTE FISH TOXICITY TEST

Customer Name: Alaskan Copper
Address: 628 South Hanford
Seattle, WA 98124

Contact: Greg Speer
Phone: (206) 623-5800 ext. 569

Sample Identification: Sample "C"
Analysis Performed: Hazardous Waste Characterization

TEST METHOD:

1. **Toxicity test method used:**
   Salmonid survival test- "General Procedure for Static-Bioassay to Evaluate Industrial Effluent Toxicity," Washington Department of Ecology. Revised January 24, 1984; and Biological Testing Methods. Part A, Static Acute Fish Toxicity Test." DOE 80-12. Revised July 1981.
2. **End point(s) of test:**
   Mortality or 96 hours
3. **Deviations from reference method, if any, and the reason(s):**
   No deviations
4. **Date and time test started:**
   01/24/91, 1800hrs
5. **Date and time test terminated:**
   01/28/91, 1800hrs
6. **Type of test Chamber:**
   Glass chamber, 20"X10"X15"
7. **Volume of solution used/chamber:**
   30 litters, 13" deep.
8. **Number of organisms/test chamber:**
   10 organisms
9. **Number of replicate test chambers/treatment:**
   3 replicates
10. **Acclimation of test organisms(mean and range):**
    30 days, 10 to 90 days
11. **Test temperature (mean and range):**
    12 degrees centigrade, (12.0, 11.9-12.2)

TEST ORGANISM:

1. **Scientific name:**
   Salmo gairdneri(rainbow trout)

2. **Age:**
   153 days
3. **Life stage:**
   Fingerling
4. **Mean length, weight, and loading:**
   4.3cm, 2.05gms, .68gm/l
5. **Source:**
   Cascade Rainbow Trout Fish Farm
6. **Food:**
   Trout chow
7. **Lighting:**
   16 hours light, 8 hours dark, 50 to 100 foot candles
8. **Diseases and treatment:**
   No diseases detected, no treatment necessary
9. **Dilution water used in test:**
   Dechlorinated and aged municipal water

CHEMICAL ANALYSIS:

1. **Physical and chemical methods used:**
a. Temperature-Digital temperature probe
b. Dissolved oxygen-Membrane Electrode/Azide Modification
c. pH-Standard electrode
d. Conductivity-Conductivity meter
e. Hardness-Titrimetric/EDTA
f. Alkalinity-Titrimetric/Phenolphthalein-Sulfuric acid
g. Weight-Beam balance
h. Residual chlorine-Colorimetric/Ortho-tolidine
i. Ammonia-Colorimetric/Nesslerization
j. Nitrate-Colorimetric/Cadmium reduction

RESULTS:

1. **Concentration:**
a. 1000 mg/l(ppm)
b. 100 mg/l(ppm)
c. Control
d. Reference toxicant(25 ppb copper)
2. **Observed effects:**
a. 1/30 Mortalities
b. 0/30 No mortalities
c. 0/30 No mortalities
d. 0/10 - 0% mortality
3. **Raw biological data, including daily records of affected organisms in each concentration(including controls):**
a. See appendix "A"
b. See appendix "A"
c. See appendix "A"
d. See appendix "A"
4. **Summary table of physical and chemical data:**
a. See appendix "A"
b. See appendix "A"
c. See appendix "A"
d. See appendix "A"

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3. **Life stage:**
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g. Weight-Beam balance
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RESULTS:

1. **Concentration:**
a. 1000 mg/l(ppm)
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c. Control
d. Reference toxicant(25 ppb copper)
2. **Observed effects:**
a. 16/30 Mortalities
b. 0/30 No mortalities
c. 0/30 No mortalities
d. 0/10 - 0% mortality
3. **Raw biological data, including daily records of affected organisms in each concentration(including controls):**
a. See appendix "A"
b. See appendix "A"
c. See appendix "A"
d. See appendix "A"
4. **Summary table of physical and chemical data:**
a. See appendix "A"
b. See appendix "A"
c. See appendix "A"
d. See appendix "A"

State of Washington Department of Ecology

Appendix "A"

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Bioassay Testing Lab
Analyst: Mitchell

Industry/Toxicant: Alaskan Copper
Address: Seattle, WA
Collector: (4) tomes
Date Sample Collected: 1/23/91

Beginning: Date 1/24/91 Time 1900
Ending: Date 1/28/91 Time 1900
Test Organism: Rainbow Trout
Required Test Temperature Range: 12°C ± 1°C

Laboratory Reference Number	Test Container No.	Conc. (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as $CaCO_3$)		Total Alkalinity (mg/l as $CaCO_3$)		Conductivity uMHOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
Control	19	0	0	0	0	0	0	12.0	11.0	10.2	9.0	7.8	6.92	~	~	~	6.55	11.9	12.1	12.0	12.0	12.1	<20	<20	40	40	40	40
Reference	29	25ppb	0	0	0	0	0	12.1	10.7	9.8	8.7	8.1	6.91	~	~	~	6.89	12.0	12.1	12.1	12.1	12.0	<20	<20	40	40	40	50
Sample A	30		0	0	0	0	0	12.0	10.8	9.7	8.6	7.3	6.89	~	~	~	6.59	12.0	12.0	12.1	12.1	12.2		<20		40		50
	33		0	0	0	0	0		10.9	9.6	8.1	7.4						12.1	12.1	12.0	12.1	12.1						
	63		0	0	0	0	0		10.6	8.5	7.6	6.8						12.0	11.9	12.0	12.0	12.1						
	47		0	0	0	0	0	12.0	11.1	10.0	8.8	7.9	6.88	~	~	~	6.70	12.0	11.9	11.9	11.9	11.8		<20		40		60
	41		0	0	0	0	0		10.7	9.3	8.6	7.7						12.1	11.9	12.0	12.0	12.0						
	48		0	0	0	0	0		11.2	10.3	9.0	7.9						12.0	12.0	12.1	12.1	12.1						
B	9		0	0	0	0	0	12.0	11.0	10.2	8.8	7.6	6.91	~	~	~	6.57	12.0	12.1	12.0	11.9	11.9		<20		40		50
	17		0	0	0	0	0		10.4	9.1	8.4	7.8						11.9	11.9	11.8	11.9	12.0						
	36		0	0	0	0	0		10.9	9.8	8.6	7.3						12.0	12.0	12.0	12.1	12.0						
	12		0	0	0	0	1	12.1	11.0	9.9	8.8	7.5	6.85	~	~	~	6.49	11.9	11.9	12.0	12.0	11.9		<20		40		50
	20		0	0	0	0	0		10.9	9.8	8.7	7.6						11.9	11.9	12.0	12.0	12.0						
	46		0	0	0	0	0		10.7	9.3	8.4	7.2						11.9	11.9	11.9	11.8	11.9						

Sample Description: A = black floc, B = black ~~mixed~~ floc, C = black floc
Average Weight: .2805 Mean Length: 4.3 Longest: 4.6 Shortest: 3.6 Ratio (long/short): 1.2 P
Number of organisms per chamber: 10 Ratio of flesh to water: .68 gm/L Comments:

* Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

ECY 030-1-40

DATA VERIFIED BY: CS DATE: 1/29/91

____ EHW > 10/30
____ DW > 11/30

AKC-0014442

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Bioassay Testing Lab
Analyst: Getchell

Industry/Toxicant: Alaska Copper
Address: Seattle WA
Collector: Customer
Date Sample Collected: 1/23/91

Beginning: Date 1/24/91 Time 1800
Ending: Date 1/28/91 Time 1800
Test Organism: Rainbow Trout
Required Test Temperature Range: 12°C ± 1.5°C

Laboratory Reference Number	Test Container No.	Conc. (mg/l)	Number of Cumulative Deaths 0	24	48	72	96	Dissolved Oxygen (mg/l) 0	24	48	72	96	pH 25 C 0	24	48	72	96	Temperature (C) 0	24	48	72	96	Total Hardness (mg/l as $CaCO_3$) 0	96	Total Alkalinity (mg/l as $CaCO_3$) 0	96	Conductivity uMHOS/cm 0	96
"C"	42	100	0	0	6	0	0	12.0	10.9	9.8	8.3	6.8	6.89	—	—	—	6.50	12.1	12.0	12.0	12.1	12.0	<20	<20	40	40	40	40
	38	"	0	0	0	0	0		10.8	9.5	8.0	7.2						11.9	11.9	11.8	11.9	12.0						
	49	"	0	0	0	0	0		10.6	9.3	7.9	6.5						12.0	12.0	12.0	12.1	12.1						
	43	1000	0	0	?	1?	1	12.0	11.0	10.1	8.9	7.6	6.87	—	—	—	6.79	12.0	12.1	12.1	12.2	12.1	<20	<20	40	40	40	50
	39	"	0	0	?	10	10		11.1	10.0	8.6	7.7						12.1	12.1	12.1	12.2	12.1						
	37	"	0	0	?	3?	5		10.9	9.8	8.3	7.4						11.0	11.9	11.9	11.9	12.0						

Sample Description
Average Weight ____ Mean Length ____ Longest ____ Shortest ____ Ratio (long/short) ____
Number of organisms per chamber ____ Ratio of flesh to water ____ Comments ? = sample water very dark, hard to count any mortalities

* Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

ECY 030-1-40

DATA VERIFIED BY [signature] DATE 1/29/91

___ EIIW > 10/30
X DW > 11/30

AKC-0014443